

MAR 19690023: BOW VALLEY

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ECONOMIC MINERALS

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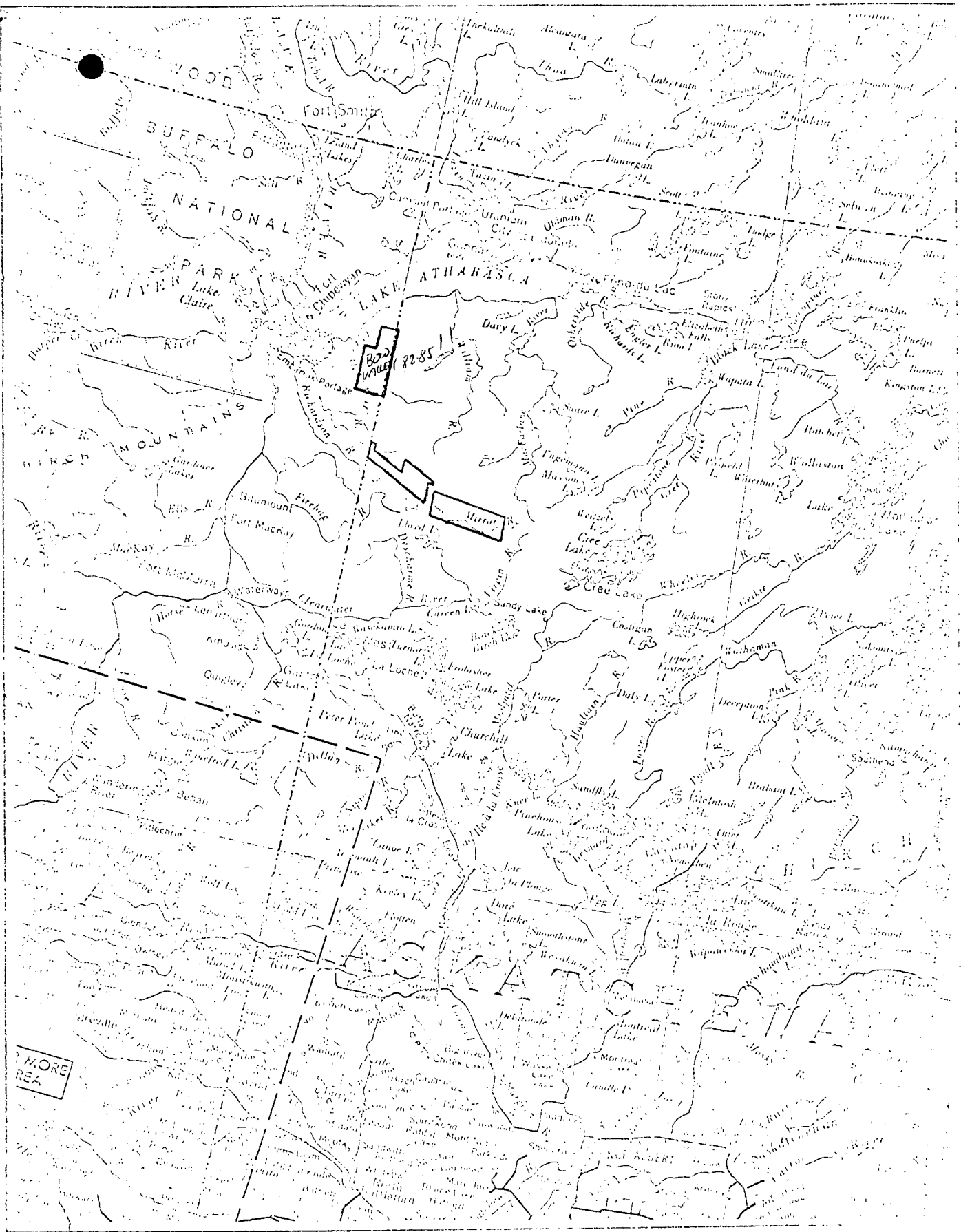
REPORT ON
Interpretation of Aeromagnetic Data
For
BOW VALLEY LAND COMPANY LIMITED
(Permit Nos. 1 and 2 - Saskatchewan)
And
NATIONAL NICKEL LIMITED
(Permit Nos. 82, 83, 84, 85 in Alberta)

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MORE
REA

LOCATION MAP

REPORT ON THE
INTERPRETATION OF AEROMAGNETIC DATA

For

BOW VALLEY LAND COMPANY LIMITED
(Permit Nos. 1 and 2 in Saskatchewan)

And

NATIONAL NICKEL LIMITED
(Permit Nos. 82, 83, 84 and 85 in Alberta)

INTRODUCTION

Bow Valley Land Company Limited, permit nos. 1 and 2 are located in northern Saskatchewan. With reference to the National Topographic System, these permits fall in 74-F-7, 8, 9, 10 and 74-F-11, 13, 14 respectively. The third area named National Nickel Limited permit nos. 82, 83, 84 and 85 is located in north-eastern Alberta adjoining the Saskatchewan boundary and falls in 74-L-8, 9, 16. These permit areas are easily accessible by chartered flights from Fort McMurray or Fort Chipewyan, northern Alberta.

The permits are located at the southwest and western edge of the Athabasca Sandstone and very little or nothing is known about the area under consideration. Prior to the Federal-Provincial aeromagnetic surveys (1962, 1963), no geophysical work has been done over this area. Beyond the sandstone boundary, preliminary geological mapping was carried out by Ells and Brownie (G.S.C.

Map 578A, 1941) and Tremblay (G.S.C. Map 16, 1961). In 1963 and 1968 reconnaissance seismic work over the general sandstone area was tried by G.S.C. in cooperation with the Saskatchewan Department of Mineral Resources. In 1964, the Government of Saskatchewan initiated an incentive program to develop the northern part of the province. Under this program the Government of Saskatchewan contributed 50% of the expenses to the individuals or the companies involved in exploring northern Saskatchewan. This program finally led to the discovery of uranium in the Wollaston Lake area, announced by Gulf Oil Company in December 1968. Subsequently, a rush to acquire the mineral permits in northern Saskatchewan took place. Presently, intensive exploration program is going on which might lead to the discovery of various base metals and radio active minerals in the province of Saskatchewan and the adjoining areas.

The present maps and report are based on the interpretation of the existing Federal-Provincial aeromagnetic data.

AEROMAGNETIC DATA

The original profiles and tie maps were obtained to analyse the magnetic data over the permit areas. The magnetic surveys were carried out by the Canadian Aero Service Ltd. and Aero Surveys Ltd., according to the specifications of the Geological Surveys of Canada and the provincial Department of Mineral Resources.

The flight line spacing was 1/2 mile apart in an east-west direction and at an altitude of 1000 feet above the ground. The aeromagnetic maps covering three different permit areas are shown in maps 1A, 2A and 3A respectively.

Depth Calculations From Magnetic Data

The proper selection of anomaly and the choice of position and attitude of the profile are the most important factors which may govern the success of the depth calculation method. Although one must be careful that the magnetic anomaly should be "clean" i.e., uninfluenced by the effects of neighbouring anomalies or by any local regional gradient. With enough care one can obtain the dependable results by selecting the suitable anomalies. The method gives a depth estimate that is not based on any topographic irregularity in the basement surface but rather on a susceptibility contrast (e.g., dyke or plug of basaltic material intruded into granitic rocks that comes up to the basement surface.) The values obtained are depths to their tops in the areas of susceptibility difference which may delineate, in general, configuration of the basement. The depths to the source of magnetic anomalies below the surface were calculated using the magnetic records and the results are shown in maps 1B, 2B and 3B for three different areas.

Geological Correlation From Magnetic Data

Usually larger magnetic anomalies are caused by changes

in composition of the igneous basement rocks. Thus it is possible to sketch the boundaries of the major basement rock bodies from the magnetic map. Aeromagnetic maps can also be very useful in revealing geological structures such as strike, dip, faults and folds. The interpreted geology under the sandstone area is shown in maps 1C, 2C and 3C.

BOW VALLEY LAND COMPANY LIMITED
Permit #1

Discussion

Very little is known about the geology of the area. In general, the topography is quite flat and low lying. Much of the country is covered by lakes and swamps. The northern part of the permit area is covered with sandstone and very few outcrops exist in the southern half.

In general, the permit falls along the magnetic trend in a north-easterly direction and appears to have large scale intrusive activity. The area may be divided into three parts separated by magnetic lows. The eastern part (with maximum magnetic anomaly 2300 gammas) show strong magnetic relief compared to the western part (with maximum magnetic anomaly of 1000 gammas) and the central part (with maximum magnetic anomaly of 500 gammas). The area has been subjected to large scale geological activity and is quite complex. It is difficult

to find suitable anomalies for depth calculations. Some of the depths calculated are shown on map 1B. In the area, mafic type of rocks and the pegmatite bodies constitute the intrusive rocks and have inter-mingled with the country rocks which consist of undifferentiated biotite, biotite-hornblende, garnet-quartz-feldspar gneisses and paragneisses. The basic rock types form part of the large scale intrusive to the south of the permit area. The interpreted geology is shown on map 1C. Generally, magnetic lows coincide with lineaments, shear zones and are also shown on map 1C.

A gravity high trend passes through the permit area and coincides with the magnetic high. The rock units along this trend consists of highly dense material and seems to have their source of origin close to the surface. The rocks consist of undifferentiated biotite, biotite-hornblende and garnet-quartz-feldspar gneisses.

Conclusions and Recommendations

General correlation between the magnetic and gravity data indicate highly dense type of rocks in the permit area and needs further investigation to find the association of base metals with these rocks. The possibility of sulphide mineralization occurring in the area is dependent upon the nature of the invading solutions.

The radiometric anomalies in the area are generally associated with magnetic lows and should be correlated with radiometric results for detailed analysis.

Assuming that the source of the magnetic anomalies lies on top of the basement, one may be able to say that the thickness of the sandstone is approximately 1700 feet below the surface. Although, there are magnetic anomalies which may be due to the intrusive rocks within the sandstone or under the basement rocks and would provide smaller or larger depth respectively. Such anomalous situations require further investigation in the field.

BOW VALLEY LAND COMPANY LIMITED
Permit #2

Discussion

The area is magnetically flat and is probably due to a thick layer of sandstone which may be masking the effect of the underlying rocks. In general, the magnetic data does reflect some intrusive activity in the area. The northwest part of the permit area has a maximum magnetic anomaly of 300 gammas, whereas the southeast and central parts indicate maximum anomaly of 200 gammas. The source of the anomalies in the southeast section seems to lie at a depth of about 300 to 700 feet, whereas the source of the central anomaly is at a depth of 900 to 1300 feet below the surface. The central anomaly seems to dip in a south-southeasterly direction. The north-western area is rather complex and it is difficult to find

a suitable anomaly for depth calculations. The main anomaly is most probably due to change in basement composition. Its source may be anywhere from 1500 to 2800 feet below the surface. In general, the basement in the central part of the permit seems to be about 3300 feet below the surface. The calculated depths are shown on map 2B.

The general geology and the shear zones interpreted from magnetic data is shown on map 2C. Most of the area, except some of the intrusive rocks or dykes, is underlain by undifferentiated biotite, biotite-hornblende and garnet-quartz-feldspar gneisses. Intrusive rocks and dykes consist of amphibolite, pyroxene, amphibolite, norite, gabbro, granite and pegmatite bodies. Some of the magnetic anomalies indicate that the bodies which are causing them are narrow, dyke-like structures. The bodies causing the anomalies appear to lie beneath relatively shallow overburden from 300 to 700 feet in depth. Few dykes are located in the south-east part and some of the small basic intrusives are in the central part of the permit area.

A gravity low trend (map 2D) passes through the centre of this permit and indicates that the area is covered with low density material. The source of the magnetic anomaly is deep, somewhere 1500 to 3000 feet below the surface. The dykes in the south-eastern portion of the area seem to be close to

the surface, which could be due to the intrusive activity through the sandstone formation.

In this area, the radiometric anomalies are usually associated with magnetic lows. For further analysis, one should correlate with detailed radiometric results in the area.

Conclusions and Recommendations

The depths to the source of magnetic anomalies indicate that some of the dykes in the south-east part of the permit area are quite shallow and close to the surface. These dykes may be associated with the pegmatite type of bodies and should be further correlated with radiometric results to find the possibility of radioactive minerals in the area.

NATIONAL NICKEL LIMITED
Permits #82, 83, 84 and 85

Discussion

Most of the country is quite flat and is covered with lakes and swamps. The area is covered with Athabasca Sandstone and nothing is known about the underlying rocks. With the exception of two magnetic anomalies, the permit area is magnetically flat. It seems that thick sandstone overlying the basement rocks masks the magnetic effect. One magnetic anomaly trending east-west lies in range 1, and twp. 112 and has maximum anomaly of 450 gammas. The other one trends in a north-westerly direction and lies in range 2, twp. 109, 110, with a maximum magnetic anomaly

742-P73
742-P74

of 550 gammas.

The source of the first anomaly lies at a depth of 2800 to ⁸⁵³ 3600 feet and may be dipping in a northern direction. On the other hand, the source of the second anomaly lies at a depth of 2300 to ⁷⁰¹ 3200 feet with a dip in a southernly direction. The calculated depths are shown on map 3B.

Interpreted geology from magnetic data is displayed on map 3C. Most of the area underlain with undifferentiated biotite, biotite-hornblende and garnet-quartz-feldspar gneisses.

Conclusions and Recommendations

Interpreted geology has been obtained from the magnetic data (Map 3C). The depths to the sources of magnetic anomalies were also calculated and are shown on map 2B. Radiometric results may be used to correlate the magnetic lows for uranium-bearing minerals in the area.

Respectfully submitted,

VELOCITY SURVEYS LIMITED,



R.G. Agarwal, Ph.D., P.Eng.
Manager-Mining and Gravity Division.

QUARTZ MINERAL EXPLORATION PERMIT No. 82

(744/8)

NATIONAL NICKLE LTD.,
203 - 415 - 3rd. STREET WEST,
CALGARY 1, ALBERTA.

DATE OF ISSUE - DECEMBER 16, 1968
AREA - 49,920 ACRES.

TP.108

TP.107

TP.106

R. 2

R. 1 W. 4 M.

QUARTZ MINERAL EXPLORATION PERMIT No. 84

(74L/9)

NATIONAL NICKLE LTD.,
203 - 415 - 3rd. STREET WEST,
CALGARY 1, ALBERTA.

DATE OF ISSUE - DECEMBER 16, 1968
AREA - 49,920 ACRES

CORRECTION LINE

TP. 110

TP. 109

R. 2

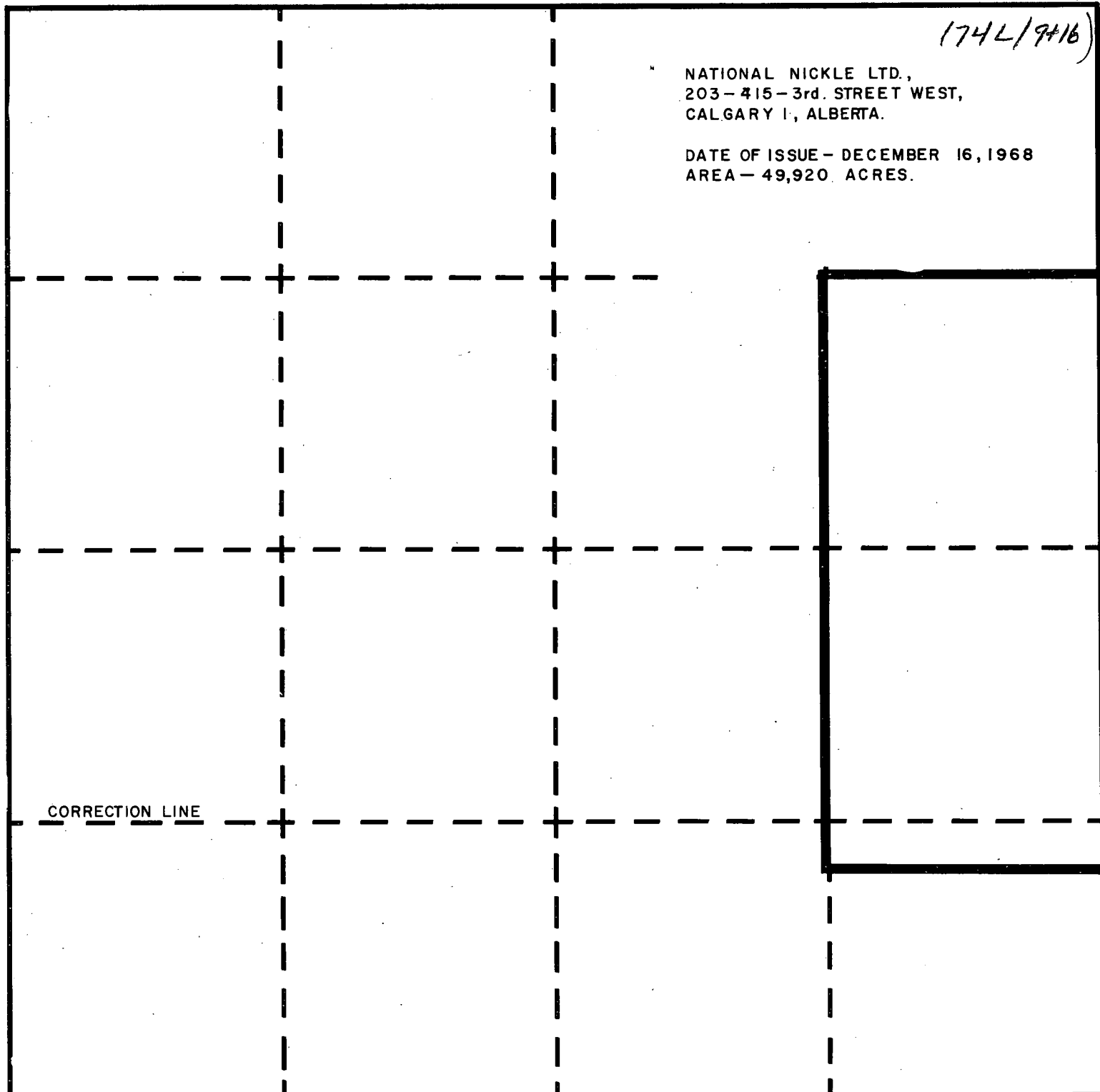
R. 1 W. 4 M.

QUARTZ MINERAL EXPLORATION PERMIT No. 85

(74L/9+16)

NATIONAL NICKLE LTD.,
203 - 415 - 3rd. STREET WEST,
CALGARY 1, ALBERTA.

DATE OF ISSUE - DECEMBER 16, 1968
AREA - 49,920 ACRES.



TP.112

TP.III

TP.IIO

CORRECTION LINE

R.2

R. 1 W. 4 M.